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**Thoughts and Considerations  
from the  
Daya Bay Experience**  
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# Overview

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- Daya Bay was a joint US-China construction project, with Taiwan, Hong Kong, Russia and Czech Rep.
  - Detector: ~50%:50% US/China, ~10% others
  - Civil: China
- Co-spokespersons: China and US (non-China)
  - Collaboration: 50% China, 40% US
- Subsystem co-managers
- Operations: US-China
  - Common Fund by collaboration membership
- International Finance Committee
  - annual US-China meeting
  - Executive Board tried to represent various funding sources
- Daya Bay was a green field site



# Outline

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- International framework
- Communication
- Imports/Exports
- Daya Bay as green field site
- Safety
- Cultural differences
- Project lessons
- Collaboration lessons



# International Framework

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- US-China Treaty
  - 1979 (Jimmy Carter/Deng Xiaoping) under control of State Department
- Implementing Accord on Science and Tech.
  - 1979 (DOE/Ministry of Science & Technology)
  - Points of Contact: DOE-OHEP/Chinese Academy of Science
- Daya Bay works under the auspices of US-China treaty – important!
- But MOU was signed by BNL, LBNL and IHEP (not DOE or CAS). LOG was important!



# Communications

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- Meetings (at all levels) need minutes, should be face-to-face, all decisions and actions items should be summarized at the end of each meeting
  - design
  - Safety and work planning
  
- Cultural differences
  - What does “yes” mean?
  
- Different time scales and approval processes
  - Hard to focus on issues not yet required by your funding agency



# Communications

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- We would expect to push-decision making down as far as reasonable.
  - Not used to centralized decision making
  - We expect(ed) distributed authority
- Make sure that there are appropriate levels of authority to appeal to



# Export/Imports

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- US Export Control laws
  - Review all equipment purchased by or shipped from the US
  - China and India are both sensitive countries
  - “Deemed” exports, intellectual property, etc...
- Chinese Import Duties
  - Needed list in advance (before we finished design)
  - Needed US-China Treaty



## Greenfield site

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- Not a national laboratory
  - Expectation of finding common tools and equipment
  - Difficult to arrange purchase of pliers, cable ties,...
  - Hard to plan all needed common tools and items
  - Must provide all manpower (crane operators, welders, etc... not available from another experiment in emergency)
- What are rules for use of machine shops, cranes, vehicles, forklifts



# Safety

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- Safety review processes
- Safety standards
  - Equipment/design reviews
  - Work procedures
  - Worker training/PPE (personnel protective equip.)
- Safety personnel (especially onsite)
- Work planning required constant vigilance.
- Liability



# Cultural Difference

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- How (who) to make decisions (verify concurrence)
- Document decisions, action items, results
- Contracting practices
- Review process
- Liability



# Project'ology

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- Decouple KPP from any milestones out of your control
  - Can never have too much schedule contingency?
- Good engineers to work with physicists in all mgmt.
- Try to understand nonverbal and unwritten rules of communication. Face-to-face contact essential.
- Technical translation can be very difficult
- Decouple deliverables by institution as much as possible
  - Clean WBS
- Assure that key installation decision makers are onsite
- Maintain minutes, insist on responses to all action items
- Formal work plans, ORR, onsite safety personnel



# Collaboration

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- Bylaws (owned by collaboration) and MOU (owned by Labs and project)
- IB represents all institutions
- EB supposed to concur on L2 managers, scientific scope, key technical decisions (bigger role in Operations phase)
- Tensions between countries
- Tensions between collaboration and project



## Summary

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- Daya Bay: successful example of international collaboration on a large scale (~50%:50%)
- Many challenges
- Daya Bay experience may not be relevant to LBNE. (DB site owned by China, LBNE site by US)
- ...